WHAT IS CLAIMED IS:

1. A method for measuring a shape of a tubular body, comprising:

making a pair of reference portions and internal peripheral surfaces of vicinities of both end portions of the tubular body in contact with each other;

rorating the tubular body such that contact portions where the tubular body and the pair of reference portions come in contact with each other shift on the internal peripheral surface in a circumferential direction of the tubular body with positions of the pair of reference portions fixed; and

detecting radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body at at least one position outside the tubular element, the at least one position being fixed relative to the circumferential direction of the tubular element.

2. The method for measuring a shape of a tubular body as recited in claim 1, wherein each of the pair of reference portions is formed into a spherical shape.

3. The method for measuring a shape of a tubular body as recited in claim 1, wherein each of the pair of reference portions is in contact with the internal peripheral surface of the tubular element with a certain contact length in an axial direction of the tubular element.

4. The method for measuring a shape of a tubular body as recited

in claim 1, wherein the pair of reference portions is fixed relative to the circumferential direction thereof so as not to be rotated in accordance with the rotation of the tubular body at least when the tubular body is rotated to detect the radial displacement of the external peripheral surface of the tubular body.

5. The method for measuring a shape of a tubular body as recited in claim 1, wherein the pair of reference portions is constituted as rotating members rotatably supported, and exterior peripheral surfaces of the reference portions are in contact with the internal peripheral surface of the tubular body so as to be rotated together with the tubular body in accordance with the rotation of the tubular body.

6. The method for measuring a shape of a tubular body as recited in claim 5, wherein the pair of reference portions is supported by reference portion supporting axes from both outsides of the tubular body respectively, and wherein reference portion supporting axes are rotatably supported by bearings disposed outside both end portions of the tubular body.

7. The method for measuring a shape of a tubular body as recited in claim 1, wherein at least one of the pair of reference portions is constituted such that the at least one of the pair of reference portions is capable of changing its position among plural positions in an axial direction of the tubular body and capable of being fixed at each of the plural positions.

8. The method for measuring a shape of a tubular body as recited in claim 1, wherein two supporting rollers disposed at each of both ends of the tubular body are brought into contact with an external peripheral surface of end portions of the tubular body to thereby press the tubular body against the pair of reference portions.

9. The method for measuring a shape of a tubular body as recited in claim 1, wherein detecting positions of the displacement include a position facing off against a straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions is in contact from an outside of the tubular body but not facing off against the pair of reference portions.

10. The method for measuring a shape of a tubular body as recited in claim 9, wherein the detecting positions of the displacement include a position facing off against the pair of reference portions from an outside of the tubular body.

11. The method for measuring a shape of a tubular body as recited in claim 9, wherein the detecting positions of the displacement include plural positions located outside the tubular body.

12. The method for measuring a shape of a tubular body as recited in claim 11, wherein the detecting positions of the

displacement include plural positions different in the axial direction of the tubular body.

13. The method for measuring a shape of a tubular body as recited in claim 11, wherein the detecting positions of the displacement include plural positions which are the same in axial directional position of the tubular body but different in peripheral directional position thereof.

14. The method for measuring a shape of a tubular body as recited in claim 11, wherein the detecting positions of the displacement include two positions which are the same in axial directional position of the tubular body but different in peripheral directional position by a half peripheral length of the tubular body.

15. An apparatus for measuring a shape of a tubular body, comprising:

a pair of reference portions in contact with an internal peripheral surface of vicinities of both end portions of the tubular body disposed horizontally or near horizontally;

a pedestal portion that supports the tubular body, wherein the pedestal portion is in contact with an external peripheral surface of the tubular body from a lower side of the tubular body so that a height of the internal peripheral surface of the tubular body is positioned at the same height or almost at the same height of the pair of reference portions;

a pressing portion that presses the external peripheral surface

of the tubular body so as to press the tubular body against the reference portion, the pressing portion being provided at an outside of the tubular body; and

a displacement detecting device that detects radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body when the tubular body rotates in a state in which the tubular body is in contact with the pair of reference portions at a position facing off against a hypothetical straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions contact from an outside of the tubular body.

16. The apparatus for measuring a shape of a tubular body as recited in claim 15, wherein the tubular body is rotated manually.

17. The apparatus for measuring a shape of a tubular body as recited in claim 15, wherein the displacement detecting device is provided with:

a contact portion that comes into contact with the external peripheral surface of the tubular body; and

a biasing means that urges the contact portion so as to be pressed against the external peripheral surface of the tubular body,

wherein the displacement detecting device detects the displacement caused by the rotation of the tubular body from a movement of the contact portion and also functions as the pressing portion for pressing the external peripheral surface of the tubular body so as to press the tubular body against the pair of reference portions.

18. The apparatus for measuring a shape of a tubular body as recited in claim 15, wherein a stopper which comes into contact with an end surface of the tubular body to regulate an axial position of the tubular body is equipped only at one side of the tubular body.

19. An apparatus for measuring a shape of a tubular body, comprising:

a pair of reference portions which come into contact with internal peripheral lower surfaces of vicinities of both end portions of a tubular body disposed horizontally or nearly horizontally;

four supporting rollers which come into contact with external peripheral lower surfaces of the tubular body to support the tubular body and press the tubular body against the pair of reference portions, wherein two of the four supporting rollers are disposed at one of end portions of the tubular body and the other two of the four supporting rollers are disposed at the other side portion of the tubular body; and

a displacement detecting device that detects radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body when the tubular body rotates in a state in which the tubular body is in contact with the pair of reference portions at a position facing off against a straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions contact from an outside of the tubular body.

20. The apparatus for measuring a shape of a tubular body as recited in claim 19, further comprising an elevating means for moving up and down the supporting rollers in an up-and-down direction or almost up-and-down direction so as to move up and down the tubular body supported by the supporting rollers between a measuring position where the internal peripheral lower surface comes into contact with the pair of reference portions and an apart-position where the internal peripheral lower surface is apart from the pair of reference portions.

21. The apparatus for measuring a shape of a tubular body as recited in claim 20, wherein the elevating means comprises, at respective side end portions of the tubular body, an elevating member rotatably supporting two of the supporting rollers, a moving direction regulating means for limiting a moving direction of the elevating member to an up-and-down direction or almost up-and-down direction and a driving means for moving up and down the elevating member.

22. The apparatus for measuring a shape of a tubular body as recited in claim 19, wherein the supporting rollers constitute a provisional platform.

23. The apparatus for measuring a shape of a tubular body as recited in claim 19, wherein each of the supporting rollers is provided with a smaller diameter portion comes into contact with the external peripheral lower surface of the tubular body and a larger diameter portion located outside the smaller diameter portion, and wherein

the larger diameter portion has a rising surface which comes into contact with a side end surface of the tubular element to define an axial position of the tubular body.

24. The apparatus for measuring a shape of a tubular body as recited in claim 19, wherein the supporting rollers come into contact with the tubular body at positions different from contact positions of the pair of reference portions and the tubular body in an axial direction of the tubular body.

25. The apparatus for measuring a shape of a tubular body as recited in claim 19, further comprising a tubular body transferring means for transferring the tubular body from a certain transfer position onto the supporting rollers.

26. A method for measuring a shape of a tubular body, comprising:

temporarily correcting cross-sectional shapes of both end portions of the tubular body by bringing plural correcting rollers into contact with both end portions of the tubular body;

rotating the tubular body in a state in which the cross-sectional shapes of the both end portions are temporarily being corrected; and

detecting radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body.

27. The method for measuring a shape of a tubular body as

recited in claim 26, wherein deformation of both end portions of the tubular body by the temporary correction is performed within an elastic deformation area of the tubular body.

28. The method for measuring a shape of a tubular body as recited in claim 26, wherein deformation of both end portions of the tubular body by the temporary correction is performed so as to reach an elastic deformation area of the tubular body.

29. The method for measuring a shape of a tubular body as recited in claim 26, wherein, in a state in which the cross-sectional shapes of both end portions of the tubular body is temporarily being corrected, the correction rollers are fixed at respective positions where the correction rollers just come into contact with corresponding assumed internal or external peripheral surface of the tubular body whose cross-sectional shape of both end portions is proper.

30. The method for measuring a shape of a tubular body as recited in claim 26, wherein at least one of the plurality of correcting rollers is pressed against the tubular body with pressing force changing in response to a rotational phase of the tubular body.

31. A method for measuring a shape of a tubular body, comprising:

plastically deforming both end portions of the tubular body to correct a cross-sectional shape of both end portions by rotating the tubular body while pressing both end portions with a plurality of

correcting rollers; and

decreasing pressing force of the correcting rollers against the end portions of the tubular body and then continuously rotating the tubular body while bringing at least a part of the correcting rollers into contact with the tubular body to detect radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body, thereby performing a measurement of the shape of the tubular body.

32. The method for measuring a shape of a tubular body as recited in claim 31, wherein, after the correction of the cross-sectional shape of both end portions of the tubular body, an ex-post measurement of the cross-sectional shape of both end portions of the tubular body is performed by detecting the radial displacement of the internal and/or external peripheral surface of both end portions of the tubular body caused by a rotation of the tubular body rotated in a state in which at least a part of the correcting rollers is in contact with both end portions of the tubular body with slight pressing force, and wherein the correction is repeated if the result of the ex-post measurement fails to meet a predetermined criterion.

33. A method for measuring a shape of a tubular body, comprising:

inserting a pair of expandable clamps into the inside of vicinities of both end portions of the tubular body;

expanding the pair of expandable clamps to thereby bring the pair of expanded clamps into contact with internal peripheral surfaces

of the tubular body along entire circumference thereof;

rotating the tubular body together with the expandable clamps about a central axis of the pair of expandable clamps as a rotation axis; and

detecting radial displacement of an external peripheral surface of the tubular body caused by a rotation of the tubular body at at least one position positioned outside the tubular body and fixed with respect to a circumferential direction of the tubular body.

34. The method for measuring a shape of a tubular body as recited in claim 33, wherein the pair of expandable clamps is brought into contact with support scheduled positions of the tubular body in use.

35. The method for measuring a shape of a tubular body as recited in claim 33, wherein the pair of expandable clamps is brought into face-contact with the internal peripheral surface of the tubular body along the entire circumference thereof.

36. The method for measuring a shape of a tubular body as recited in claim 33, wherein the pair of expandable clamps press radially outwardly an entire circumference of the internal peripheral surface of the tubular body evenly or approximately evenly.

37. The method for measuring a shape of a tubular body as recited in claim 36, wherein the pair of expandable clamps causes enlarged deformation of the tubular body by pressing the internal

peripheral surface of the tubular body radially outwardly.

38. The method for measuring a shape of a tubular body as recited in claim 1, wherein the tubular body is a photosensitive drum substrate for a photosensitive drum.

39. An inspection method of a tubular body, comprising:

measuring a shape of the tubular body according to the method for measuring a shape of a tubular body as recited in claim 1; and

inspecting whether the shape of the tubular body falls within a predetermined allowable range based on the measured result.

40. A method for manufacturing a tubular body, comprising:

manufacturing a tubular body;

inspecting a shape of the tubular body by the inspection method of a tubular body as recited in claim 39; and

discriminating that the tubular body is a completed product if the inspection result shows that the shape of the tubular body falls within the predetermined allowable range.

41. A tubular body manufactured by the method for manufacturing a tubular body as recited in claim 40.

42. A photosensitive drum substrate manufactured by the method for manufacturing a tubular body as recited in claim 40.

43. A method for manufacturing a tubular body, comprising:

manufacturing a tubular body;

measuring a shape of the tubular body by the method for measuring a shape of a tubular body as recited in claim 8;

inspecting whether the shape of the tubular body falls within a predetermined allowable range based on the measured result; and

discriminating that the tubular body is a completed product if the inspection result shows that the shape of the tubular body falls within the predetermined allowable range.

44. A photosensitive drum raw tube manufactured by the method for manufacturing a tubular body as recited in claim 43, wherein no contact trace extending in a circumferential direction exists on an external peripheral surface except for both end portions thereof.

45. A method for manufacturing a tubular body, comprising:

manufacturing a tubular body;

measuring a shape of the tubular body by the method for measuring a shape of a tubular body as recited in claim 9;

inspecting whether the measured result of the radial displacement of an external peripheral surface of the tubular body at a position facing off against a straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions contact from an outside of the tubular body but not facing off against the pair of reference portions falls within a predetermined allowable range; and

discriminating that the tubular body is a completed product if the inspection result shows that the shape of the tubular body falls

within the predetermined allowable range.

46. A tubular body manufactured by the method for manufacturing a tubular body as recited in claim 45, wherein radial displacement of an external peripheral surface of the tubular body at a position facing off against a straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions contact from an outside of the tubular body but not facing off against the pair of reference portions is 20 μm or less.

47. A set of tubular bodies manufactured by the method for manufacturing a tubular body as recited in claim 45, wherein all of the tubular bodies contained in the set are 20 μm or less in radial displacement of an external peripheral surface of the tubular body at a position facing off against a straight line passing two contact portions where the internal peripheral surface of the tubular body and the pair of reference portions contact from an outside of the tubular body but not facing off against the pair of reference portions.

48. An apparatus for inspecting a tubular body, comprising:

an apparatus for measuring a shape of a tubular body as recited in claim 19; and

a comparative means for inspecting whether the shape of the tubular body falls within a predetermined allowable range based on the displacement detected by the displacement detecting device.

49. A system for manufacturing a tubular body, comprising:

a tube manufacturing apparatus for manufacturing a tubular body;

an inspection apparatus for a tubular body as recited in claim 48;

an acceptance/rejection discriminating means for discriminating that the tubular body is a completed product if the inspection result by the inspection apparatus shows that the shape of the tubular body falls within the predetermined allowable range.